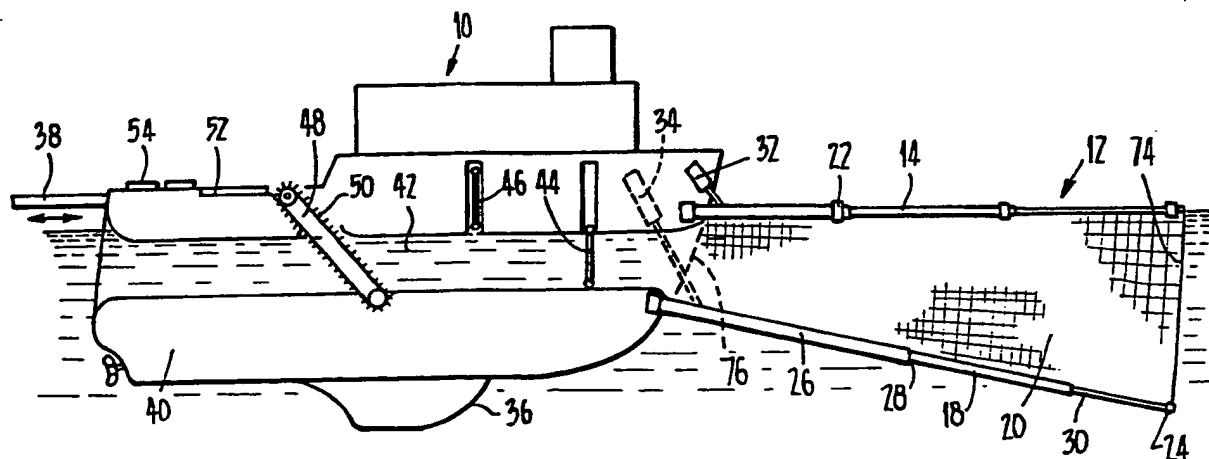


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<b>(21) International Application Number:</b> PCT/AU80/00068 <b>(22) International Filing Date:</b> 15 September 1980 (15.09.80) <b>(31) Priority Application Number:</b> PE 0494 <b>(32) Priority Date:</b> 14 September 1979 (14.09.79) <b>(33) Priority Country:</b> AU  <b>(71) Applicant; and</b> <b>(72) Inventor:</b> DeCLIFFORD, Graham, Richard [AU/AU]; 28 Conn Street, Femtree Gully, Vic. 3156 (AU).  <b>(74) Agent:</b> SANDERCOCK, SMITH & BEADLE; 203 Riversdale Road, Hawthorn, Vic. 3122 (AU).		<b>(81) Designated States:</b> AT (European patent), AU, BR, CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), JP, KP, LU (European patent), NL (European patent), NO, SE (European patent), SU, US.  <b>Published</b> <i>With international search report</i>

**(54) Title:** IMPROVEMENTS IN FISHING VESSELS**(57) Abstract**

A marine life harvesting method and apparatus in which a vessel (10) has marine life capturing means (12) consisting of telescopic booms (14, 16, 18) to which are attached a mesh or net (20). The capturing means (12) has an inlet orifice (74) and an outlet orifice (76) the outlet orifice communicating with marine life harvesting means, which may be a passage (42) through the hull (40) of the vessel, marine life entering said inlet orifice as said vessel travels across said body of water, and being diverted by said capturing means (12) to flow from said outlet orifice (76). Conveyor means (48) may be provided to remove marine life from said passage (42) to a processing station (52) and retractable grilles (44, 46) may be provided to control the flow of material through the passage.

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TITLE: IMPROVEMENTS IN FISHING VESSELS.

This invention relates to a method and apparatus for harvesting animal life from a body of water, and relates particularly to improvements in fishing vessels.

Large scale net fishing is practised today in  
5 much the same way as it has been for years, with the only technological improvements being in some of the equipment used. It is still a generally ineffective way in which to 'harvest' fish, as many fish escape from nets during the fishing operation, many fish are crushed, and many  
10 unwanted species of marine life are killed.

It is an object of this invention to provide improvements in fishing vessels, apparatus and methods which will assist fishing to become more efficient and cost effective.

15 Accordingly, the invention provides a method of harvesting material from a body of water, characterized in that said material is diverted from said body of water by capturing means (12) associated with a vessel (10), as said vessel travels relative to said body of  
20 water, said diverted material being subsequently processed.

The invention also provides apparatus for harvesting material from a body of water, characterized in that capturing means (12) are associated with a vessel  
25 (10), said capturing means (12) including a portion (74) allowing the material to enter the capturing

means (12) when said vessel (10) is travelling relative to said body of water, said capturing means (12) being adapted to divert said material to a processing station.

Embodiments of the invention will be described  
5 in detail hereinafter, with reference to the accompanying drawings, in which:-

Fig. 1 is a schematic side view of a vessel embodying one form of the invention;

10 Fig. 2 is a schematic plan view of the vessel of Fig. 1;

Fig. 3 is a schematic plan view of portion of a second embodiment;

Fig. 4 is a schematic side elevation on a third embodiment; and

15 Fig. 5 is a schematic side elevation of a fourth embodiment;

Dealing firstly with Figs. 1 and 2, there is shown a vessel 10 having capturing means 12 secured thereto. The capturing means 12 consists of four  
20 telescopic booms, only three of which, 14, 16 and 18 are shown. The booms are pivotally connected to the hull 40 of the vessel, preferably to an area near the bows which has been strengthened with additional plating. The telescopic booms are arranged as shown in Fig. 1, with  
25 telescopic portions 26, 28 and 30.

The booms 14, 16, 18 are in this embodiment arranged in a truncated right pyramid orientation, and apart from being telescopic, are capable of being raised from, and lowered into a body of water by means such as  
30 the hydraulic means 32, 34. The top booms 14, 16 may be provided with floats 22 which enable them to be retained on or near the surface of the body of water. The booms are covered with a net mesh 20 to complete the capturing means. Open-weave interlaced wire material (known in  
35 Australia as cyclone wire) has been used in a prototype

arrangement.

The capture structure 12 has a large open end 74 and a smaller open end 76 the uses of which will be described hereinafter. In the embodiment of Figs. 1 and 2, the hull 40 of the vessel 10 has a pass 42 extending therethrough, from stem to stern. Two grilles 44, 46 may be provided such that they may be moved from a position where they are located across the passage (as in the case of 44) to a position where they are not obstructing the passage.

The vessel is also provided with a marine life conveyor means 48, which includes an endless conveyor 50 provided with marine life engaging portions of a flexible nature. The upper end of conveyor means 48 is located near a processing station 52 which may be in the form of a sorting area. Marine life sorted at the station 52 may be packaged at a packaging station 54 which may take any suitable form. A second conveyor means 56 operates to return unwanted material to the body of water, laterally with regard to the directions of travel of the vessel.

To balance the vessel when the capturing means 12 is in the water, a weight cage 38 may be provided, movable between an extended position, when the means is in the body of water, and a retracted position within the hull 40, when the means is raised from the body of water. In addition, a retractable keel 36 may be used to balance the vessel when the means 12 is in a raised position. Finally, sensing means 24 may be associated with the lower booms of the capturing means 12 so that obstructions ahead of the means may be located, and the booms raised to clear the obstructions.

In use, the capturing means is positioned as shown in Figs. 1 and 2, except that the keel 36 is retracted. The vessel is caused to move forward, and as

a result, water will flow through passage 42 from bow to stern. Water will pass through the net or mesh 20, but any marine life larger than the mesh size will be diverted into passage 42. Marine life, if allowed to  
5 flow past grilles 44, 46, will impinge on conveyor belt 50, which is preferably formed of an open weave material to allow the passage of water therethrough. The marine life will be transported by conveyor means 48 to the processing station 52, where it may be sorted, manually  
10 or automatically. Selected marine life would be packaged at packaging station 54, and most probably would be frozen forthwith. Unwanted and/or undersized samples would be placed on second conveyor means 56 and ejected laterally back into the body of water.

15 Other forms of harvesting may be used. A mesh cage may be dropped into passage 42, allowed to fill with marine life, and then be removed to a sorting area, to a freezing area, or may be jettisoned, with floats, back into the body of water, or are attached to marker buoys,  
20 to be picked up by another ship.

In this embodiment, grille 44 is formed from a 'fine' mesh of a size comparable with the mesh 20 of capturing means 12. Grille 46 is provided with a much coarser mesh. In the event that a large squid, shark,  
25 dolphin or the like is captured, grille 46 would be lowered, and conveyor means 48 would be raised so that it no longer obstructed passage 42. Once the particular marine life sample was retained behind grille 46, grille 44 would be lowered, preventing ingress of further marine  
30 life into the area between grilles 44 and 46. Such marine life in the area prior to the lowering of grille 44 are able to exit through grille 46. Grille 46 is then raised, and the particular marine life sample is allowed to pass through the remainder of passage 42 to return to  
35 the body of water.

A water speed of 9 knots is considered most efficient for the marine life harvesting operation. The open construction of the mesh 20 provides for minimum drag when travelling at such a speed. Aircraft or other fish locating means may be used to spot schools of fish, and the vessel could steam back and forth through the school, harvesting the fish most efficiently.

In Fig. 3, the passage 42 is omitted or not used, and orifices 60 are provided in mesh 20 on either side of the bow, near the bow. Nets 58, possibly of a conventional material, are located to catch marine life diverted by capturing means 12, and the nets may be hauled up when full, to remove the marine life in a conventional manner, or by using some of the processing equipment described in relation to Figs. 1 and 2.

In Fig. 4, where for convenience the capturing means 12 is not shown, a hollow compartment 66 in the bows region of the vessel is provided. The compartment has an orifice 62 communicating with opening 76 in means 12, and a door 64 adapted to close the compartment. In use, door 64 would be opened, to allow water and captured marine life into the compartment. At a predetermined time, door 64 is closed, and at least some of the water pumped out, facilitating the harvesting of marine life, possibly using the equipment described in relation to Figs. 1 and 2.

Finally, Fig. 5 shows an embodiment where passage 42 is an external frame 68, attached by an intermediate member 70 to hull 40. Again, the capturing means 12 is not shown. The passage may be provided with all the equipment described in relation to passage 42 of Figs. 1 and 2, or it may lead to a net 72, which could be removed and replaced, the contents being removed in a conventional manner. The passage 42 could be located in one of two or more hulls, or located between hulls, of a

vessel.

It should be noted that features of the vessel, the capturing means and the harvesting means, are largely well known, and require no further explanation. It is  
5 envisaged that hydraulics will be used to operate such features as the telescoping booms, the raising and lowering of the booms, and the grilles, but other forms of motive power may be used. The booms, for example may be positioned using a crane, and there may be cross-  
10 members between adjacent booms.

It will be appreciated that the method and apparatus described herein provide an efficient and rapid means of harvesting marine life, with a minimum of wastage and a maximum of conservation.



CLAIMS:

1. A method of harvesting material from a body of water, characterized in that said material is diverted from said body of water by capturing means (12) associated with a vessel (10), as said vessel travels relative to said body of water, said diverted material being subsequently processed.
2. A method according to claim 1, characterized in that said material is harvested by being withdrawn from an area which communicates with said capturing means (12), said area being located in, or associated with, said vessel (10).
3. A method according to claim 2, wherein said area is a passage (42) through the hull of said vessel (10), or is associated with (68) said vessel (10).
4. Apparatus for harvesting material from a body of water, characterized in that capturing means (12) are associated with a vessel (10), said capturing means (12) including a portion (74) allowing the material to enter the capturing means (12) when said vessel (10) is travelling relative to said body of water, said capturing means (12) being adapted to divert said material to a processing station.
5. Apparatus according to claim 4, characterized in that said capturing means includes at least one boom (14) extending from the vessel (10), net or mesh material (20) being attached to said boom (14) to form said capturing means (12), with an inlet orifice (74) and an outlet orifice (76).
6. Apparatus according to claim 5, characterized in that said capturing means (12) consists of four telescopic booms (14, 16, 18) extending from the bow area of the vessel.
7. Apparatus according to claim 6, characterized in that when said booms (14, 16, 18) are in the extended position, they lie along the edges of an imaginary truncated right pyramid.

8. Apparatus according to claim 7, characterized in that the booms (14, 16, 18) are adapted to be lifted out of the body of water.

9. Apparatus according to claim 8, characterized in that the upper booms are provided with floats (22) to maintain them, in use, on the surface of the body of water.

10. Apparatus according to claim 9, characterized in that sensing means (24) are associated with the lower booms (18) in order that they may be raised when solid matter is sensed.

11. Apparatus according to claim 10, characterized in that a movable balancing weight (38) is provided on said vessel, movable between a position where said booms are extended and in the body of water, and a position where they are retracted and out of the body of water.

12. Apparatus according to claim 10 or 11, characterized in that a retractable keel (36) is provided to balance the vessel.

13. Apparatus according to any one of claim 4 to 12, characterized in that material is harvested from said harvesting means by use of a net (58) which is located about the bows of the vessel.

14. Apparatus according to any one of claims 4 to 12, characterized in that the outlet orifice (76) of said capturing means (12) communicates with a passage (42) through the hull of said vessel from stem to stern.

15. Apparatus according to claim 14, characterized in that conveyor means (48) are provided to transport animal life from said passage to a processing station (52).

16. Apparatus according to claim 15, characterized in that said conveyor means (48) is retractable.

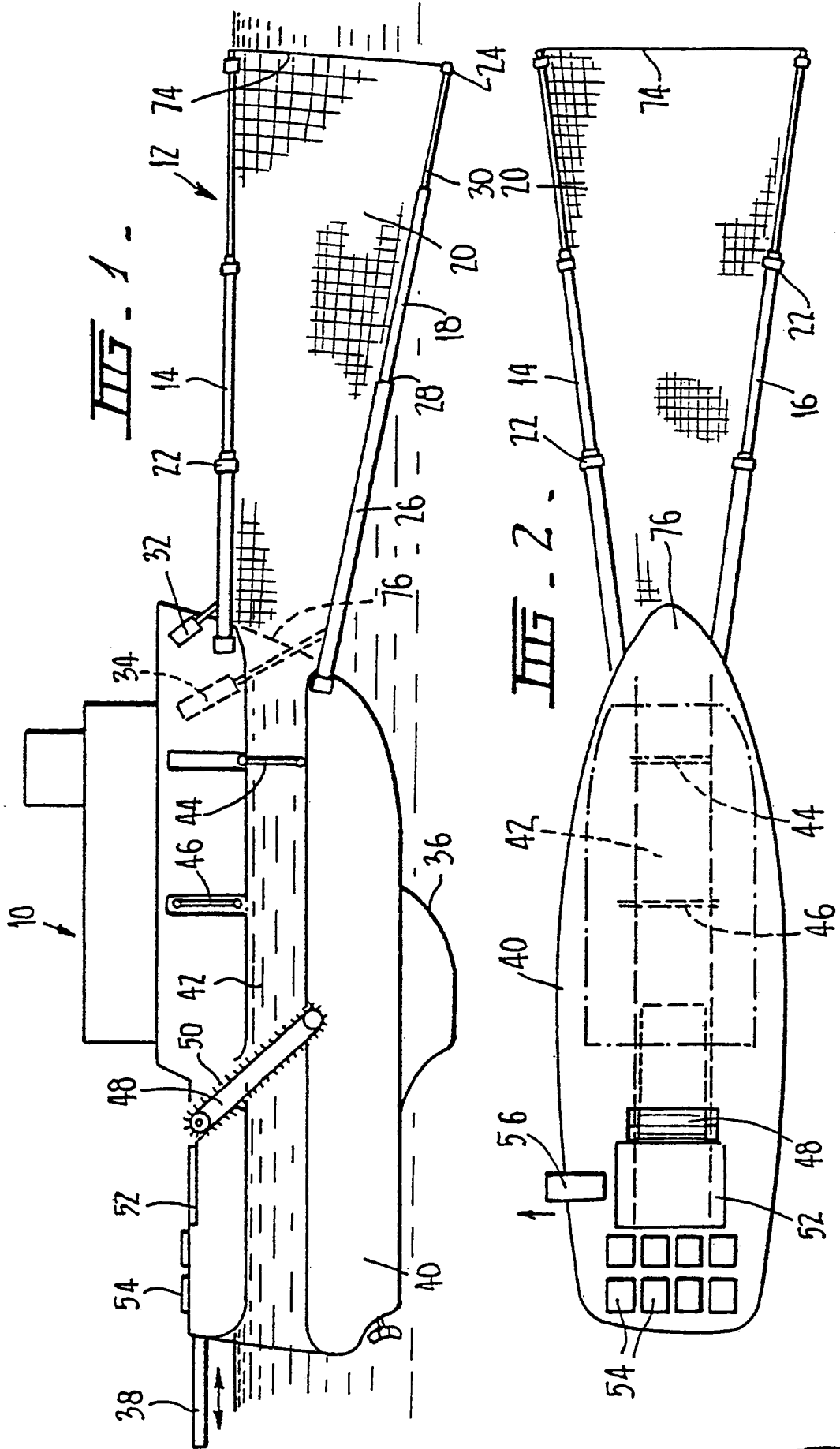
17. Apparatus according to claim 16, characterized in that said processing area (52) has return means (56)

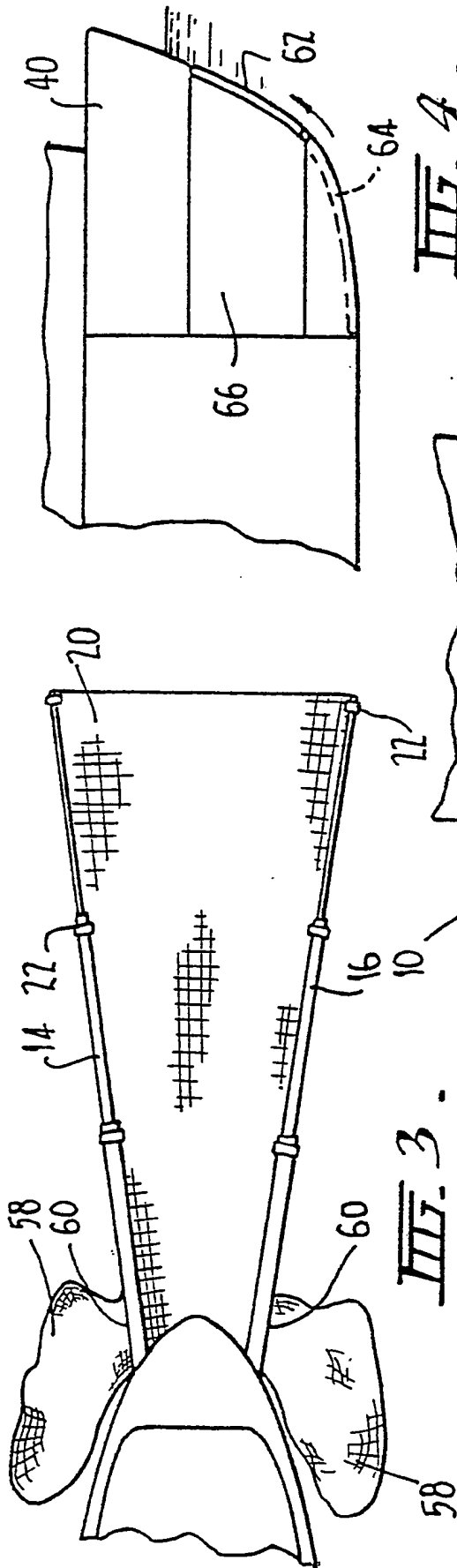
associated therewith, to return selected material to the body of the water laterally with respect to the hull (40) of the vessel.

18. Apparatus according to any one of claims 13 to 17, characterized in that at least one gate (44) is provided in said passage.

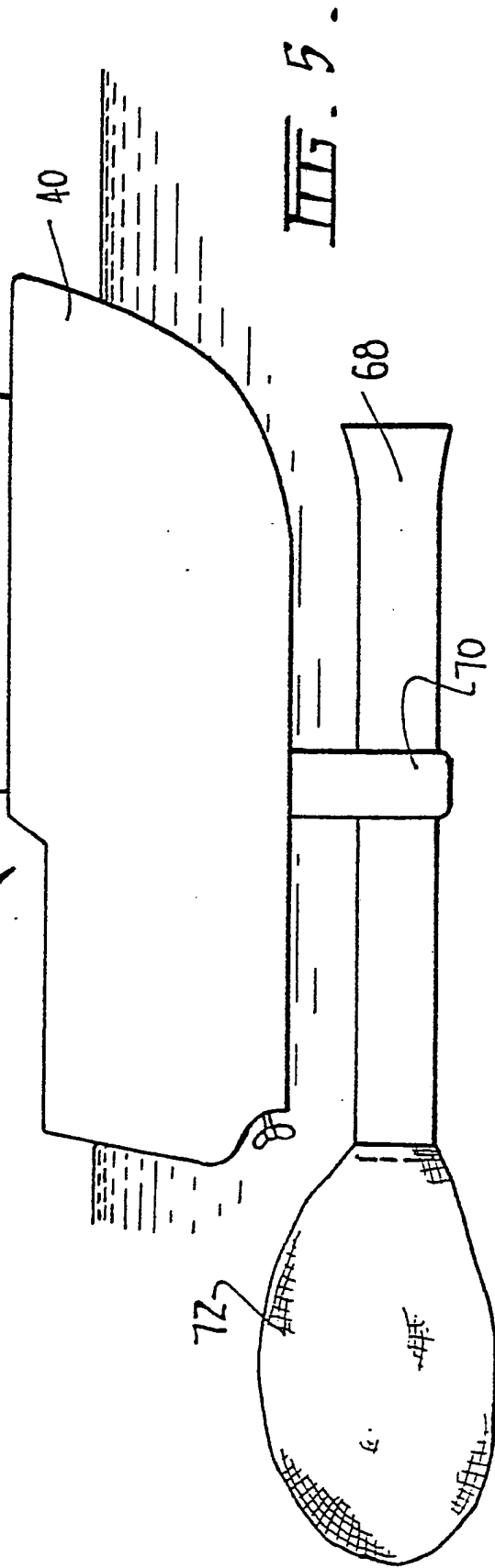
19. Apparatus according to any one of claims 13 to 18, characterized in that said passage is in a subsidiary hull (68), or is attached to said hull (40).

20. Apparatus according to any one of claims 4 to 12, characterized in that said outlet orifice (76) of said capturing means (12) communicates with an opening (62) to an area (66) in the bow of said vessel, water and animal life being admitted through said opening (62) on operation of a door, and in that at least a portion of said water is pumped from said area before the animal life is further processed.





III. 3.



III. 4.

# INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 80/00068

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-family: monospace; font-size: 1.2em;">Int. Cl<sup>3</sup>. A01K 79/00 B63B 35/14</div>																													
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; font-size: 0.8em;">Minimum Documentation Searched <sup>4</sup></div> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%; border: none; vertical-align: top;">Classification System</td> <td style="border: none; vertical-align: top;">Classification Symbols</td> </tr> <tr> <td style="border: none; text-align: center; padding-top: 10px;">IPC</td> <td style="border: none; text-align: center; padding-top: 10px;">A01K 79/00</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup></div> <div style="padding: 10px; margin-top: 10px;">             AU: IPC as above; and B63B 35/14              Australian Classification 38.5 91.2           </div>			Classification System	Classification Symbols	IPC	A01K 79/00																							
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; font-size: 0.8em;">Category <sup>6</sup></th> <th style="width: 70%; font-size: 0.8em;">Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 20%; font-size: 0.8em;">Relevant to Claim No. <sup>18</sup></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">P,X</td> <td style="vertical-align: top;">AU, A, 35776/78, published 1979, November 8, Rene Hervieu (DE 2819444 published 03.05.80) corresponds.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 1464623, published 1923, August 14, Nels A. Lybeck.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 2651874, published 1953, September 15, Ellis W. Key.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 3786592, published 1974, January 22, Jack E. Miller.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 4086717, published 1978, May 2, Ano J. Aucoin.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">GB, A, 819865, published 1959, September 9, Arsaell Janasson. (German Patentschrift 1092722 and French Pat. 1154198 correspond).</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">German Patentschrift 416627, published 1925, July 21, Lybeck Ocean Harvester Co.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">German Patentschrift 500121, published 1930, June 18, Jan Hess.</td> <td style="text-align: center; vertical-align: top;">1-20</td> </tr> </tbody> </table>			Category <sup>6</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	P,X	AU, A, 35776/78, published 1979, November 8, Rene Hervieu (DE 2819444 published 03.05.80) corresponds.	1-20	X	US, A, 1464623, published 1923, August 14, Nels A. Lybeck.	1-20	X	US, A, 2651874, published 1953, September 15, Ellis W. Key.	1-20	X	US, A, 3786592, published 1974, January 22, Jack E. Miller.	1-20	X	US, A, 4086717, published 1978, May 2, Ano J. Aucoin.	1-20	X	GB, A, 819865, published 1959, September 9, Arsaell Janasson. (German Patentschrift 1092722 and French Pat. 1154198 correspond).	1-20	X	German Patentschrift 416627, published 1925, July 21, Lybeck Ocean Harvester Co.	1-20	X	German Patentschrift 500121, published 1930, June 18, Jan Hess.	1-20
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<b>IV. CERTIFICATION</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <div style="font-size: 0.8em;">Date of the Actual Completion of the International Search <sup>2</sup></div> <div style="text-align: center; padding: 10px; font-family: monospace; font-size: 1.1em;">17 October 1980 (17.10.80)</div> <div style="font-size: 0.8em;">International Searching Authority <sup>1</sup></div> <div style="text-align: center; padding: 10px; font-weight: bold;">AUSTRALIAN PATENT OFFICE</div> </td> <td style="width: 50%; border: none; vertical-align: top;"> <div style="font-size: 0.8em;">Date of Mailing of this International Search Report <sup>3</sup></div> <div style="text-align: center; padding: 10px; font-family: monospace; font-size: 1.1em;">04 NOVEMBER 1980 (04-11-80)</div> <div style="font-size: 0.8em;">Signature of Authorized Officer <sup>20</sup></div> <div style="text-align: center; padding: 10px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> <span style="font-size: 0.8em;">R.E.W. MAY</span> </div> </div> </td> </tr> </table>			<div style="font-size: 0.8em;">Date of the Actual Completion of the International Search <sup>2</sup></div> <div style="text-align: center; padding: 10px; font-family: monospace; font-size: 1.1em;">17 October 1980 (17.10.80)</div> <div style="font-size: 0.8em;">International Searching Authority <sup>1</sup></div> <div style="text-align: center; padding: 10px; font-weight: bold;">AUSTRALIAN PATENT OFFICE</div>	<div style="font-size: 0.8em;">Date of Mailing of this International Search Report <sup>3</sup></div> <div style="text-align: center; padding: 10px; font-family: monospace; font-size: 1.1em;">04 NOVEMBER 1980 (04-11-80)</div> <div style="font-size: 0.8em;">Signature of Authorized Officer <sup>20</sup></div> <div style="text-align: center; padding: 10px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> <span style="font-size: 0.8em;">R.E.W. MAY</span> </div> </div>																									
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